

ABSTRACT

The present invention relates to a distribution optical fiber sensor system capable of measuring a distortion and a temperature of a structure with a high spatial resolution in view of a transient phenomenon. The distribution optical fiber sensor system of the present invention is provided with an optical fiber to be placed on an object to be measured; a light source for emitting a first pulse light having a pulse width longer than a transient response of an acoustic phonon and emitting a second pulse light in succession to the first pulse after a time interval during which the vibration of the acoustic phonon is substantially maintained, thereby supplying the first and second pulse lights to the optical fiber; a detector for detecting scattering gain spectra of a Brillouin-scattered light created in the optical fiber by the second pulse light at time intervals corresponding to twice the time obtained by equally dividing the pulse width of the second pulse light; and a controlling/calculating unit for calculating the distortion and/or the temperature based on the respective scattering gain spectra for small sections of the optical fiber corresponding to the respective scattering gain spectra at the respective time intervals.